

Radiation Security System Assessment for 2002 Reports, Trips, and Bypasses

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Purpose

The following is a compilation of trips and bypasses of the Radiation Security System (RSS) during the 2002 operation period including January 2003. Action plans are identified to reduce weaknesses and improve system performance and reliability.

The objectives of this assessment are to illuminate potentially hazardous conditions from which the RSS may be protecting us, identify weaknesses, and find ways to reduce the number of trips by understanding root causes and making improvements that make the system more reliable and less likely to trip for reasons not associated with true potentially hazardous occurrences. A RSS that is highly reliable and not prone to false trips is believed to be more valuable because of the confidence that operators have in it and the vigor that they will use in understanding the reasons from trips when they do occur. There is less likelihood of rationalizing a trip that is not understood if the system is trusted to not trip except to protect against hazardous situations.

The action items contained in this report will be reviewed in the next assessment. Any items not completed will be reevaluated and retained on the action plan is appropriate. Explanations for progress will be documented therein.

RSS Problems (from 5000.3 reports and LANSCE-6 Investigation Reports)

No DOE Order 5000.3 reports were filed on incidents related to RSS during these operational periods.

There were no LANSCE-6 Investigation reports assigned for incidents related to the RSS during this operational period.

Lessons Learned

1. In no case is it known that the RSS failed to shut down beam when it should have.
2. A comparison of trips dating back to 1991 (in some cases) is shown in the attached graphs. The number of days/trip in Line D is much lower than the historical numbers whereas the number of days/trip for the LINAC backbone and Line X is consistent with or better than the historical data. The Line D data for this year is skewed somewhat due to the fact that 59 of the trips were caused by

equipment problems. 51 of those 59 trips were due to instabilities in ROQU06 and LDQD29, malfunctioning power supplies for 1RXL01 and LDXL00, and vacuum problems in the Blue Room during foil irradiations. In all cases, maintenance was performed to correct the problems once the specific cause was identified. If one omits these trips, there were 43 trips during this past operating cycle, which is similar to previous years but slightly higher than the last 3 years.

3. There were no trips on 4FP15R since the albatross was replaced with redundant RSS switches.
4. Personnel actions continue to cause numerous RSS trips (16 in 2002, 12 in 2001, 16 in 2000, and 10 in 1999).
5. Of the 16 trips caused by personnel actions, five of the trips occurred on Flight Path 4. Due to mechanical failures of the sample hatch motor, a crane had to be used to lift the sample hatch, which did not require a kirk key to operate. Signs were posted on the sample hatch and the sweep and entry procedure was modified to reflect the proper mode of operation. LANSCE-12 Group Management was also notified of the continued problems caused by not following procedures. These efforts were unsuccessful in preventing users from improperly opening the sample hatch.
6. The RSS bypass for the Target 2 flight paths will no longer be needed once all the WNR flight paths are upgraded to EPACS systems. Three of the RSS bypasses were used during the installation of the new RSS switches on 4FP15R and will not be needed again. Four RSS bypasses were used during failures of the XLs. A new power supply design should eliminate the need for their use again.

2002 Action Items (including updates on prior action items)

1. Mechanical and electrical integrity of interlocks should be evaluated and improved as part of the on-going RSS upgrade program. – F. Gallegos, J. Sturrock, LANSCE-2 Mechanical Support.

No progress.
2. Document the justification for instrument locations and thresholds used in the RSS. – Physics Team, F. Gallegos

No progress.
3. Install EPACS systems on remaining flight paths at the Lujan Center as they become operational. – F. Gallegos, J. Sturrock

ONGOING.

EPACS systems were installed and activated on Flight Paths 1, 10, 11, and an interim system was installed on Flight Path 12 during the 2002-2003 operating period.

4. Install EPACS systems on all remaining flight paths at WNR. – F. Gallegos, J. Sturrock

No progress due to lack of funding and higher priority outage activities.

5. Provide status updates on long-term items that LANSCE-6 has responsibility for that have been identified by the Radiation Safety Committee. – F. Gallegos

No progress.

6. In response to the large number of trips caused by magnet power instabilities, the Magnet Power Supply team will continue to replace and upgrade older supplies as funding permits. – S. Cohen

7. In response to the abnormal number of XL trips, the Protective Systems Team will investigate and implement a new power supply design for the XLs. – J. Sturrock

8. In response to the consistently large number of personnel related RSS trips, this report will be placed in the Required Reading file and the importance of attention to detail will be stressed to the Beam Delivery Team members. – P. Wanco

9. In response to the large number of trips on Flight Path 4, LANSCE-12 will correct the problems with the sample hatch motor and lifting assembly so that normal hardware control can be re-established for making entries into the flight path. – R. Nelson

Analysis of RSS/PSS trips for 2002

This analysis is based on review of all pertinent RSS trip reports (LANSCE Accelerator Operations Manual, Chapter 5, Section 5) and appropriate CCRLOG entries. Attachment A contains a summary of RSS trips for 2002.

The Linac RSS System was activated on May 7, 2002 when authorization to operate H-beam to 211 Mode was obtained. This system was in service for 264 days, until January 26, 2003.

The H- Experimental Area (Line X) RSS System was activated on May 24, 2002 when authorization to operate H- beam to Line X was obtained. This system was in service for 247 days, until January 26, 2003.

The H- Experimental Area (Line D) RSS System was activated on June 1, 2002 when authorization to operate H- beam to Line D / PSR was obtained. This system was in service for 239 days, until January 26, 2003.

The concluding date for this report is January 26, 2003. The facility was placed in shutdown mode in preparation for the 2003 extended maintenance period at that time.

Ninety-four (94) trips occurred during the period May 6, 2002 to January 26, 2003. This can be compared with 38 trips in 2001, 33 trips in 2000, 28 trips in 1999, 75 trips in 1998, 51 trips in 1997, 84 trips in 1996, 74 trips in 1995, 48 trips in 1994, and 55 trips in 1993.

- There were 2 trips related to the Linac RSS Backbone. They were distributed over 264 days for an average of 132 days/trip. This can be compared with 229 days/trip in 2001, 336 days/trip in 2000, no trips in 1999, 41.6 days/trip in 1997, 64.7 days/trip in 1996, 29.3 days/trip in 1995, and 35.6 days/trip in 1994.
- Ninety-one trips were associated with Line D, with 25 of those associated with WNR, 55 associated with Line D itself, 2 associated with the 1L target, and 9 associated with ER-1/2 flight path operation. These were distributed over 239 days for an average of about 2.6 days/trip. This can be compared with 5.9 days/trip in 2001, 8.5 days/trip in 2000, 7.6 days/trip in 1999, 3.5 days/trip in 1998, 4.0 days/trip in 1997, 2.0 days/trip in 1996, 2.5 days/trip in 1995, 4.0 days/trip in 1994 and 2.6 days/trip in 1993 when PSR was operating.
- One trip was related to Line X operation. It was distributed over 247 days for an average of 247 days/trip. This can be compared to no trips in 2001, 308 days/trip in 2000, 217 days/trip in 1999, 42.8 days/trip in 1998 and 91 days/trip for similar activities in 1997.

Linac trips

- One trip was caused by pressing the LDBL1/2 Inhibit switch while the plugs were not at the “in” limit. (personnel)
- The second trip was caused by selecting 800 mode with the Line B Alcove not PACS secure. (personnel)

Area A trips

- There were no trips associated with Area A as it is not being used at this time.

Line X trip

- The one trip was caused by the Line B/C gate popping open while both Lines B and C were PACS secured. It was probably not closed securely.

Line D trips

- There were 11 trips on LDXL00 caused by a faulty power supply. The trips occurred over a period of 6 days.
- One trip involved opening downstream PACS areas while in TUBS mode with the Lujan/WNR Entry Allowed mode not made up. (ROBL01 was out) (personnel)
- There were 2 trips caused by pressing the 1LBL01 Inhibit switch prior to the beam plug reaching its ‘in’ limit. (personnel)
- One trip was caused by closing 1LDS01 with the ER1/2 FPs not Ok. (personnel)
- One trip was caused by pulling on the Service Area PACS door while secured. (personnel)
- One trip was caused by opening the LDN fence prior to inserting LDBL1/2. (personnel)
- One trip was caused by incorrectly operating the 1LDS01 disconnect switch. (personnel)
- Thirty-seven (37) GD trips occurred in Line D North/South:
 - † There were 21 trips (with different combinations of LDGD16-21 tripping) which were caused by current fluctuations in ROQU06. It was difficult to find due to the fact that the current dips were only momentary. They occurred over a period of 2 months.
 - † There were 6 trips (with different combinations of LDGD18,20,21) which were caused by instabilities in LDQD29. They occurred over a period of 2 days until the problem was repaired.
 - † Spill from LDWS04 caused a trip of LDGD01 during development.
 - † Spill from LSWS11 caused a trip of LDGD7/9.
 - † LDGD26 tripped on side A only on 2 separate occasions. No problems were found.
 - † LDGD17 tripped on side A only. No problem were found.
 - † LDGD01 tripped after several magnets in the 89 degree bend drifted.

- † LDGD01 tripped when LDMP03 tripped off.
- † LDGD01 tripped for no apparent reason during TUBS mode development.

- † LDMP03 was drifting after recovery from power outage and caused LDGD20,21 to trip.
- † 1LGD03 tripped while adjusting RODM01.

- Two trips occurred in the 1L area:
 - † Both trips occurred when one of the 1L upper target water flow switches tripped. They were cleaned and subsequently tested successfully.

- Twenty-five (25) trips occurred in the WNR area:
 - † There were 6 trips caused by a faulty power supply on 1RXL01.
 - † There were 7 trips on 1RGD03 caused by vacuum excursions during Blue Room foil irradiations.
 - † There were 3 other trips on 1RGD03 during different foil irradiation measurements caused by tuning efforts.
 - † One trip occurred on 1RGD07 and was caused by tuning efforts.
 - † One trip occurred on 1RGD5/6 due to improper setup of PSR-to-WNR. (personnel)
 - † Three trips occurred on the Target 2/4 Fence. One was attributed to wind and the other 2 were caused by faulty connectors.
 - † Three trips occurred on 4FP90L due to the door latch not securing properly.
 - † The A side of the Target 4 FPs Ok tripped for no known reason.

- Nine trips occurred in the ER-1/2 area.
 - † There were 5 trips on Flight Path 4. All were caused by experimenters opening the sample hatch prior to the shutter reaching its closed limit. (personnel)
 - † There were 2 trips on Flight Path 16. One was caused during pump motor troubleshooting and the other trip was not understood.
 - † There was one trip on Flight Path 8 which was caused by draining the mercury shutter prior to closing the disconnect switch and inserting 1LBL01. (personnel)
 - † There was one trip on Flight Path 9 that was not explained.

- 45 trips were beam related (compared with 7 in 2001, 4 in 2000, 10 in 1999, 11 in 1998, 11 in 1997, 23 in 1996 and 17 in 1995).

Analysis of RSS bypasses for Calendar Year 2002

This analysis is based on review of all pertinent RSS Interlock Control Cards (cards), associated entries in CCRLOG, and the BYPASS.LOG file generated by CCRLOG.

- One card remained from 2001 operation prior to commencing 2002 operation.
- Nine (9) cards were used during 2002 operations. Two cards (3068 and 3069) could not be located. There were no entries in the CCRLOG for these two cards.
- One card (3059) is still active. It is used to allow the Target 2 RSS to make up with 2FP7.5L, 2FP30L, and 2FP120L operational.
- Three cards (3065-3067) were used to bypass Target 4 Flight 15R on three separate occasions to allow operations while the new RSS limit switches were installed. The first card was active for 0.07 days, the second card was active for 4.04 days and the last card was active for 20.77 days.
- Two cards (3070 and 3071) were used to bypass the Target 4 Flight Path 90L shutter enable in order to perform alignment activities on the flight path. These cards were active for 1.33 and 1.29 days, respectively.
- Three cards (3072-3074) were used on three separate occasions to bypass 1RXL01 due to faulty electronics. The cards were active for 7.97, 0.73, and 8.33 days, respectively.
- One card (3075) was used to bypass LDXL01 due to failing the “A” side weekly check. The card was active for 4.44 days.
- Independent verification of removal was not documented on cards 3067, 3070, 3071, and 3072. It was documented in the CCRLOG entries.
- All cards were properly logged in the CCRLOG. The relevant entries extracted from the BYPASS.LOG file are attached. Slight differences (a few minutes) were noticed between the time stamp in the CCRLOG and the times written on the following cards: 3065, 3066, 3067, and 3070.
- Cards were authorized by Gallegos (3), Johns (3), and Pillai (3).

08:00 *** Interlock Control Installed ***

CARD NO: >3059<

DATE: 15-JUN-1999

LOCATION: 2FP30L PSS A 1RJB05 T01-49,50

2FP30L PSS B 1RJB05 T01-61,62

2FP7.5L PSS A 1RJB05 T02-13,14

2FP7.5L PSS B 1RJB05 T02-25,26

2FP00 PSS A 1RJB05 T02-49,50

2FP00 PSS B 1RJB05 T02-61,62

2FP15R PSS A 1RJB05 T03-13,14

2FP15R PSS B 1RJB05 T03-25,26

2FP60R PSS A 1RJB05 T03-49,50

2FP60R PSS B 1RJB05 T03-61,62

2FP150R PSS A 1RJB05 T04-13,14

2FP150R PSS B 1RJB05 T04-25,26

2FP30L PIT 1 A 4DJB05 T01-31,32

2FP30L PIT 1 B 4DJB05 T01-34,35

2FP7.5L PIT 1 A 4DJB05 T01-43,44

2FP7.5L PIT 1 B 4DJB05 T01-46,47

2FP00 PIT 1 A 4DJB05 T02-07,08

2FP00 PIT 1 B 4DJB05 T02-10,11

2FP00 PIT 2 A 4DJB05 T02-19,20

2FP00 PIT 2 B 4DJB05 T02-22,23

2FP00 PIT 3 A 4DJB05 T02-31,32

2FP00 PIT 3 B 4DJB05 T02-34,35

2FP15R PIT 1 A 4DJB05 T02-43,44

2FP15R PIT 1 B 4DJB05 T02-46,47

2FP30L PLUGGED 1RJB05 T01-40,41

2FP7.5L PLUGGED 1RJB05 T02-04,05

2FP00 PLUGGED 1RJB05 T02-40,41

2FP15R PLUGGED 1RJB05 T03-04,05

2FP60R PLUGGED 1RJB05 T03-40,41

2FP150R PLUGGED 1RJB05 T04-04,05

DEVICE DESCRIPTION: Target 2 FP's PSS system

Type (RP FP RSS): RSS

REASON: Permit Target 2 RSS OK with only 2FP120L operational

DEFEATED BY: Kevin Jones CHECKED BY: Chuck Burns

AUTHORIZED BY: F. R. Gallegos

10:14 *** Interlock Control Installed ***

CARD NO: >3065<

DATE: 8-JUN-2002

LOCATION: TGT4 Master Box TM15R 5+6, 7+8, 9+10

DEVICE DESCRIPTION: 4FP15R "Ready" 3 jumpers

Type (RP FP RSS): RSS

REASON: TGT 2/4 Flight Path Interlock checks

DEFEATED BY: G. Holladay CHECKED BY: B. Winton

AUTHORIZED BY: C. Pillai

11:15 *** Interlock Control Cleared ***

CARD NO: >3065<

DATE: 8-JUN-2002

REMOVED BY: G. Holladay CHECKED BY: B. Winton

16:14 *** Interlock Control Installed ***
CARD NO: >3066<
DATE: 8-JUN-2002
LOCATION: TGT 4 Master Box TM5-15R 9+10
DEVICE DESCRIPTION: TGT 4 15R Albatross
Type (RP FP RSS): RSS
REASON: TGT 2/4 "RDY" for flight path interlock chks
DEFEATED BY: G. Holladay CHECKED BY: B. Winton
AUTHORIZED BY: C. Pillai

17:00 *** Interlock Control Cleared ***
CARD NO: >3066<
DATE: 12-JUN-2002
REMOVED BY: McMillen CHECKED BY: Johns

17:09 *** Interlock Control Installed ***
CARD NO: >3067<
DATE: 12-JUN-2002
LOCATION: 4DJB01 TM5-15R 37&38, 39&40
DEVICE DESCRIPTION: WNR Safe A and B for 4FP15R
Type (RP FP RSS): RSS
REASON: FP plugged until shutter installed
DEFEATED BY: G. Johns CHECKED BY: M. McMillen
AUTHORIZED BY: F. Gallegos

09:09 *** Interlock Control Installed ***
CARD NO: >3070<
DATE: 27-JUN-2002
LOCATION: 4DJB01 TM1-28,29
DEVICE DESCRIPTION: 4FP90L Shutter Enable Bypass
Type (RP FP RSS): RSS
REASON: Perform 4FP90L alignment
DEFEATED BY: Bill Winton VERIFIED BY: Dave Bell
AUTHORIZED BY: Glen Johns

17:17 *** Interlock Control Cleared ***
CARD NO: >3070<
DATE: 28-JUN-2002
REMOVED BY: Bill Winton CHECKED BY: Scott Bussey

08:50 *** Interlock Control Installed ***
CARD NO: >3071<
DATE: 1-JUL-2002
LOCATION: 4DJB01 TM-1 28,29
DEVICE DESCRIPTION: 4FP90L Shutter Enable Bypass
Type (RP FP RSS): RSS
REASON: 4FP90L Flight path alignment
DEFEATED BY: McMillen CHECKED BY: Stephens
AUTHORIZED BY: Johns

15:58 *** Interlock Control Cleared ***
CARD NO: >3071<
DATE: 2-JUL-2002
REMOVED BY: McMillen CHECKED BY: Stephens

11:27 *** Interlock Control Cleared ***
CARD NO: >3067<

DATE: 3-JUL-2002

REMOVED BY: G Johns CHECKED BY: D Cooper

16:32 *** Interlock Control Installed ***
CARD NO: >3072<
DATE: 15-SEP-2002
LOCATION: BER19 T1A 25/26 and T2A 25/26
DEVICE DESCRIPTION: 1RXL1
Type (RP FP RSS): RSS
REASON: Inadvertent Trips
DEFEATED BY: B. White CHECKED BY: B. Baldwin
AUTHORIZED BY: Floyd Gallegos

15:54 *** Interlock Control Cleared ***
CARD NO: >3072<
DATE: 23-SEP-2002
REMOVED BY: G. Holladay CHECKED BY: K. Stephens

16:49 *** Interlock Control Installed ***
CARD NO: >3073<
DATE: 23-SEP-2002
LOCATION: BER19 T1A (25,26) T2A (25,26)
DEVICE DESCRIPTION: 1RXL01
Type (RP FP RSS): RSS
REASON: Awaiting full checks before becoming operational.
DEFEATED BY: G. Holladay CHECKED BY: K. Stephens
AUTHORIZED BY: F. Gallegos

10:21 *** Interlock Control Cleared ***
CARD NO: >3073<
DATE: 24-SEP-2002
REMOVED BY: Keith Stephens CHECKED BY: Chandra Pillai

08:27 *** Interlock Control Installed ***
CARD NO: >3074<
DATE: 13-OCT-2002
LOCATION: BER19
DEVICE DESCRIPTION: 1RXL01
Type (RP FP RSS): RSS
REASON: 1RXL01 "A" side only
DEFEATED BY: D. Bell CHECKED BY:
AUTHORIZED BY: C. Pillai

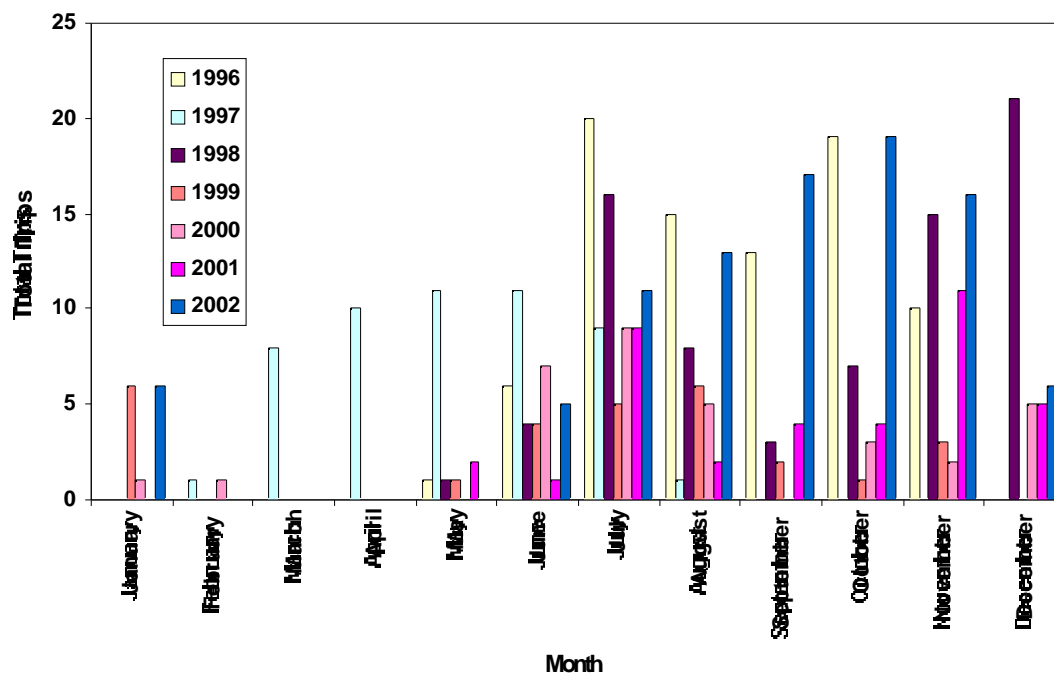
16:16 *** Interlock Control Cleared ***
CARD NO: >3074<
DATE: 21-OCT-2002
REMOVED BY: McMillen CHECKED BY: M. Martinez

11:32 *** Interlock Control Installed ***
CARD NO: >3075<
DATE: 14-NOV-2002
LOCATION: N/A
DEVICE DESCRIPTION: LDXL01
Type (RP FP RSS): RSS
REASON: LDXL01 Side A failed weekly test.
DEFEATED BY: N/A CHECKED BY:
AUTHORIZED BY: Glen Johns

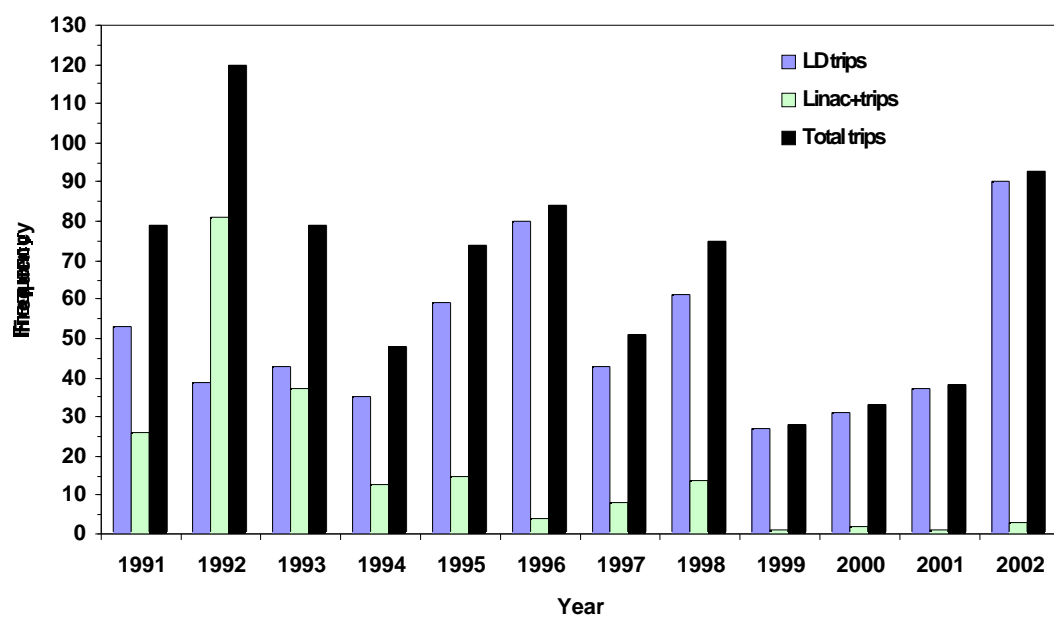
22:04 *** Interlock Control Cleared ***
 CARD NO: >3075<
 DATE: 18-NOV-2002
 REMOVED BY:D. Bell CHECKED BY:

Summary of RSS bypasses at LANSCE for Calendar Year 2002						
Card No.	Device	Date/Time Defeated	Reason	Authorized	Date/Time Cleared	Duration (days)
3065	TGT 4 15R	6/8/02 9:42	TGT 4 15R is not ready	Pillai	6/8/02 11:17	0.07
3066	TGT 4 15R "B" Albatross	6/8/02 16:00	Bypassed for interlock checks TGT 2/4 flight path interlock checks.	Pillai	6/12/02 17:00	4.04
3067	TGT 4 FP15R	6/12/02 16:50	FP bypassed until new RSS limit switches installed and checked out	Gallegos	7/3/02 11:22	20.77
3070	4FP90L shutter enable bypass	6/27/02 9:15	4FP90L flight path alignment	Johns	6/28/02 17:17	1.33
3071	4FP90L shutter enable bypass	7/1/02 8:50	4FP90L flight path alignment	Johns	7/2/02 15:50	1.29
3072	1RXL01	9/15/02 16:32	1RXL01 inadvertant trips	Gallegos	9/23/02 15:50	7.97
3073	1RXL01	9/23/02 16:49	Awating full check before becoming operational	Gallegos	9/24/02 10:21	0.73
3074	1RXL01	10/13/02 8:27	1RXL01 Side "B" failed	Pillai	10/21/02 16:16	8.33
3075	LDXL01	11/14/02 11:32	LDXL01 side "A" failed its weekly test on Sunday 11/10	Johns	11/18/02 22:04	4.44

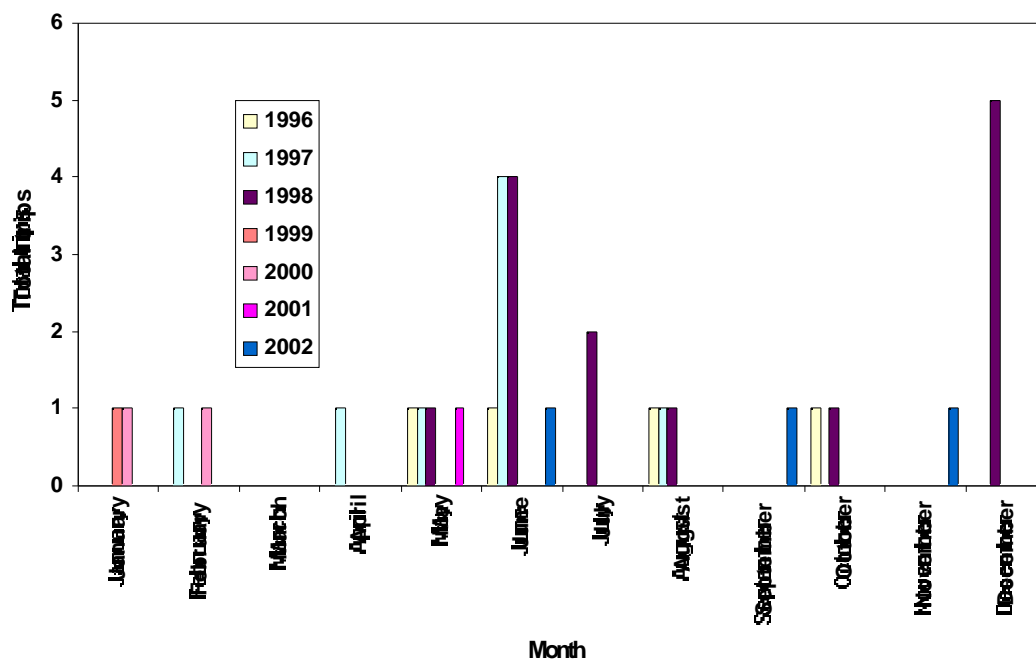
RSS Trips by Month



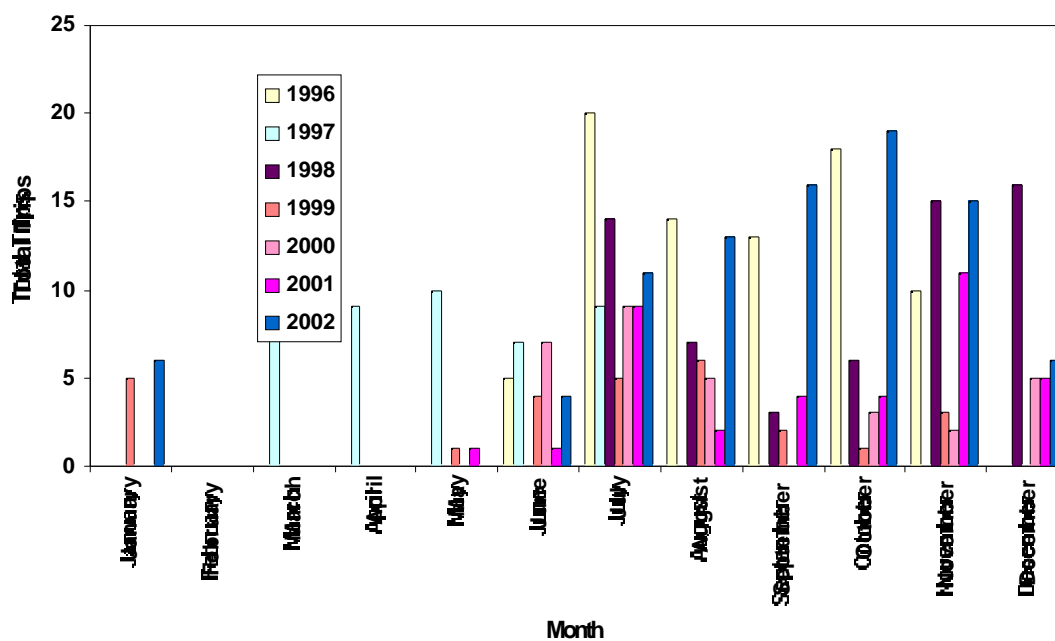
Trips/Year by Area



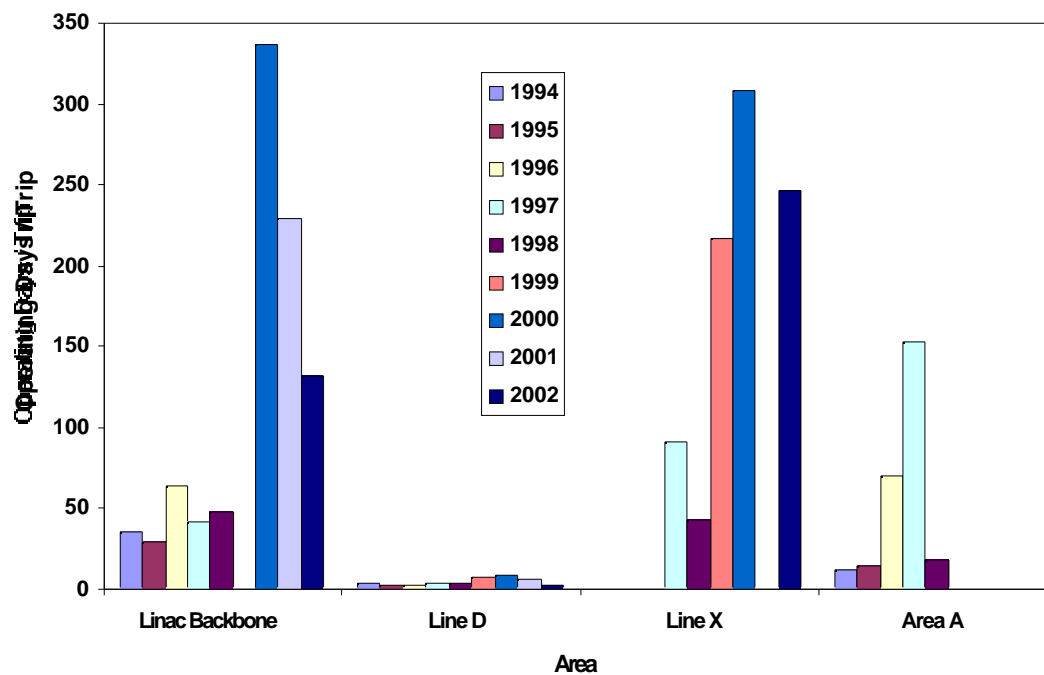
RSS Trips in Linac and Other Areas



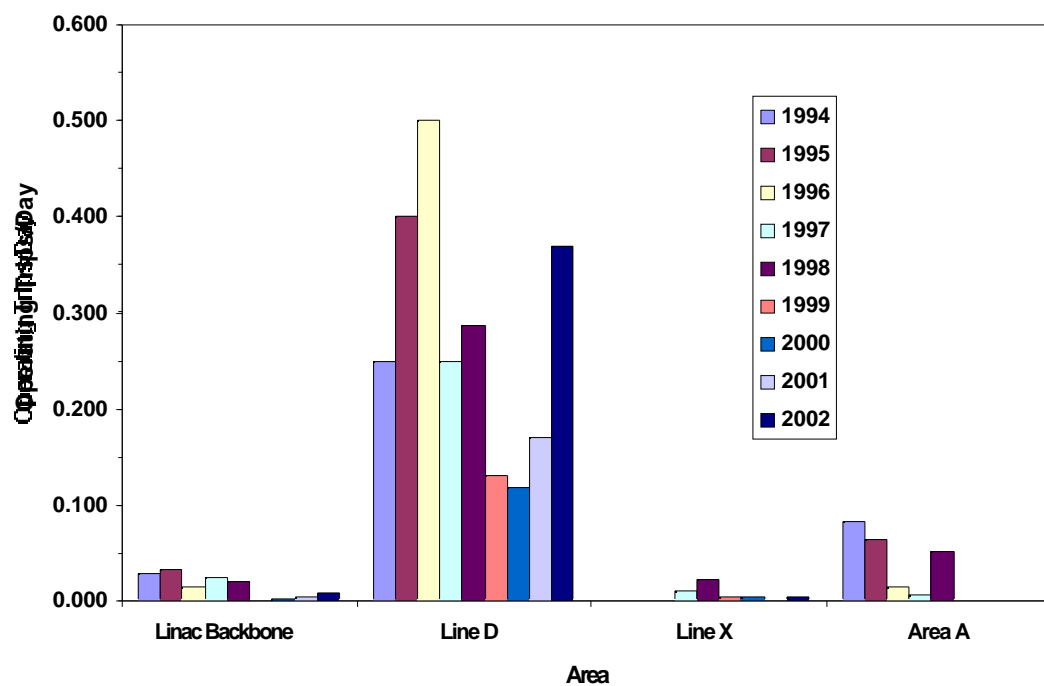
RSS Trips in Line D



RSS days/trip



RSS trips/day



Summary of RSS Trips at LANSCE for Calendar Year 2002 (in order of occurrence)							
No.	Date	Area	Device	Affected Beams	Duty Factor	Average Current	Comments
1	1-Jun-02	Line D	LDGD7+9	LBEG	0.01%	0.8	LDGD7,9 tripped while performing LD wire scan 11.
2	16-Jun-02	LDS	LDGD26	MPEG	0.02%	0.6	LDGD26 tripped on gain and PSS on "A" side only.
3	20-Jun-02	2D	1RGD5,6	LBEG	0.06%	5	Sent LBEG beam for 211 mode to PSR-WNR in 3 pulses in 3 seconds.
4	27-Jun-02	Backbone	LDBL N/INH + LDBL INPUT	N/A	N/A	N/A	LDBL1/2 were being locked and inhibited, but out still.
5	27-Jun-02	LD	LD RSS	LBEG	0.10%	5	Beam in TUBS mode with ROBL01 out. Opened the 1D roof and LDS fence with out the RO branch made up.
6	4-Jul-02	2D	1RGD07	MPEG	0.00%	1	Tuning to move the spot size as per experimenter and tripped 1RGD07.
7	7-Jul-02	LDS	LDGD26	MPEG	0.02%	2.8	Normal beam to WNR, LDGD26 trip on gain and PSS, "A" side only.
8	11-Jul-02	1L	1LBL01	LBEG	0.65%	75	Setting up for FP-16 interlock checks, 1LBL01 inhibit was depressed prior to LDBL's in.
9	22-Jul-02	1L	1LBL01	N/A	N/A	N/A	When 1LBL01 was shifted to "inhibited" the Lujan safe branch was briefly broken as the beam plug transited to the "in" limit. No challenge to the safety system occurred.
10	24-Jul-02	LD	LDGD18,20,21	LBEG/MPEG	0.87% /0.12%	100/4	Stable beam on operation. Tuning in progress.
11	24-Jul-02	LD	LDGD20,21	LBEG/MPEG	0.87% /0.12%	100/4	Stable beam on operation. Tuning in progress.
12	25-Jul-02	LD	LDGD18,20,21	LBEG	0.87%	100	Found LDQD29 is drifting.
13	25-Jul-02	PSR	LDGD20	LBEG	0.22%	25	Found LDQD29 is drifting.
14	26-Jul-02	PSR	LDGD18,20,21	LBEG	0.87%	100	LDGD18,20,21 tripped on beam and PSS. Reset locally. Magnet POC thought they had repaired LDQD29. Additional repairs are now in progress.
15	26-Jul-02	LD	LDGD20,21	LBEG/MPEG	0.87%/0.12%	100/5	LDGD 20,21 tripped on beam and PSS. Reset locally. (reports of LDQD29 was the cause)
16	29-Jul-02	PSR	1LDS01 + ER-1 FP Reset	N/A	N/A	0	Earlier FP5 shutter work had been done and ER-1 FP's Ok had not been reset when 1LDS01 was cycled.
17	8-Aug-02	WNR	1RGD03 and 07	MPEG	0.08%	3.98	1RIP2-3 tripped causing 1SV01 to close, causing spill.
18	8-Aug-02	WNR	1RGD03 and 07	MPEG	0.08%	2.1	Elevated loss levels in Blue Room due to foil irradiation. During a vacuum excursion level reached trip point on 1RGD3/7.
19	8-Aug-02	WNR	1RGD03	MPEG	0.08%	2.1	Elevated loss levels in Blue Room due to foil irradiation. During a vacuum excursion level reached trip point on 1RGD3.
20	8-Aug-02	WNR	1RGD03	MPEG	0.08%	2.1	Elevated loss levels in Blue Room due to foil irradiation. During a vacuum excursion level reached trip point on 1RGD3.
21	8-Aug-02	WNR	1RGD03	MPEG	0.12%	2.3	Elevated loss levels in Blue Room due to foil irradiation. During a vacuum excursion level reached trip point on 1RGD3.
22	9-Aug-02	WNR	1RGD03	MPEG	0.06%	2	Elevated loss levels in TGT2 due to foil irradiation. During a vacuum excursion level reached trip point on 1RGD3.
23	9-Aug-02	WNR	1RGD03	MPEG	0.06%	2	Elevated loss levels in TGT2 due to foil irradiation. During a vacuum excursion level reached trip point on 1RGD3.
24	9-Aug-02	ER-1	1DFP4	LBEG/MPEG	0.87% /0.12%	100/4	ER-1 FP4 zone 1 sample hatch was lifted before opening the shutter.
25	18-Aug-02	WNR	TGT 2/4 fence Zone 4	MPEG	0.12%	4.3	TGT 2/4 fence zone 4 dropped on loop break for the access door. (wind was present)
26	21-Aug-02	LUJAN	ER-1 Flight Path 9	LBEG	0.87%	100	Drop due to FP 9 shutter coming off closed indication with area not secure. FP 9 shutter had been experiencing a slight mercury leak.
27	24-Aug-02	LD	LDGD1	LBEG/MPEG	0.87% /0.12%	105/4.4	Several magnets in the 89 degree bend and waterfall drifted.
28	25-Aug-02	LD	ER-1 FP's not OK	MPEG/LBEG	0.12% /0.87%	5/100	1DFP16 shutter faulted, during troubleshooting of the motor, the tamper sensor of the shutter control system tripped.
29	31-Aug-02	1R	1RXL01	MPEG	0.12%	4.16	1RXL1 tripped. Performed RSS checks, checked out OK.
30	3-Sep-02	LD	LDGD20,21	LBEG/MPEG	0.87% /0.12%	105/4.3	Experienced a power transient that affected RI magnets. Upon recovery we discovered LDMP3 adjusted back to setpoint several times including once just prior to the GD trips. Similar spill pattern noted on both transients.
31	9-Sep-02	PSR	LDGD17	LBEG	0.87%	105	LDGD17 tripped on "A" side only for gain and PSS. Electronic test passed.
32	13-Sep-02	LINAC	LB Alcove PACS not ready	LBEG/MPEG	N/A	0	Beam was off. Line B alcove PACS was not ready selected 800MeV mode.
33	14-Sep-02	PSR	1LGD03	LBEG/MPEG	0.87% /0.12%	105/3.7	While adjusting RODM1 for tuning the current jumped causing beam spill on 1LGD3.
34	15-Sep-02	WNR	1RXL01	MPEG	0.12%	3.7	1RXL1 tripped. Performed RSS checks, checked out OK.
35	15-Sep-02	1R	1RXL01	MPEG	0.12%	3.6	1RXL1 tripped. Performed RSS checks, checked out OK.
36	15-Sep-02	1D	1D PACS	LBEG	0.87%	105.5	Trainee operator error attempted to enter 1D PACS area while secure. Door gave and dropped the loop.
37	15-Sep-02	1R	1RXL01	MPEG	0.12%	3.5	1RXL1 tripped. Performed RSS checks, checked out OK.
38	15-Sep-02	1R	1RXL01	MPEG	0.12%	3.5	1RXL1 tripped. Performed RSS checks, checked out OK.
39	15-Sep-02	WNR	1RXL01	MPEG	0.12%	3.6	1RXL1 tripped. Performed RSS checks, checked out OK.
40	18-Sep-02	PSR	LDGD 17,18,20,21	LBEG	0.87%	105	LDGD 17,18,20,21 tripped. No magnets found drifted.
41	25-Sep-02	LD	LDGD20,21	LBEG	0.02%	1	Master timer change in progress from LBEG length of 300 usec to 275 usec. Large spill transient occurred in Line D South. LDGD 20/21 tripped on Beam and PSS on both A + B sides
42	25-Sep-02	LD	LDGD16,17,18,19,20,21	LBEG/MPEG	.095% /0.0001%	8/0.06	LDGD 16-21 tripped. Did not find any components out of specification.
43	25-Sep-02	LD	LDGD16,17,18,19,20,21	LBEG/MPEG	.095% /0.0001%	8/0.06	LDGD 16-21 tripped. Did not find any components out of specification.
44	28-Sep-02	Line D	LDGD20,21	LBEG/MPEG	0.87% /0.12%	106/3.2	Production beam to PSR & WNR. No tuning in progress + stable when suspected RIKI misskick caused spill... or 1LMP01 because of location of spill plus crew member reports power supply sounds louder than normal.
45	29-Sep-02	Line D	LDGD20,21	LBEG/MPEG	0.87% /0.12%	102/3.2	LDGD 20,21 tripped with no tuning in progress.
46	30-Sep-02	ER-1	TGT 1FP4	LBEG/MPEG	0.87% /0.12%	102/3.2	TGT 1 FP4 experimenter stated that a new user opened the cave prior to the shutter being closed.
47	2-Oct-02	LD	LDGD20,21	LBEG	0.87%	104	LDGD 20,21 tripped. No obvious reason for trip.
48	3-Oct-02	PSR/WN	LDGD20,21	LBEG/MPEG	0.87% /0.12%	100/3.3	LDGD 20,21 tripped. Found nothing out of tolerance.
49	4-Oct-02	PSR/WN	LDGD20,21	LBEG/MPEG	0.87% /0.12%	100/3.3	LDGD 20,21 tripped. Unknown excursion.
50	6-Oct-02	LD	LDGD20,21	LBEG/MPEG	0.87% /0.12%	100/3.5	LDGD 20,21 tripped. No cause determined.
51	12-Oct-02	LD	LDGD17,18,20,21	LBEG	0.87%	100	LDGD17,18,20,21 tripped. No obvious reason for trip.
52	12-Oct-02	WNR	1RGD3,7	MPEG	0.01%	0.5	Tuning to Blue room with foils in place. Changed PW from 20 to 35 nS.
53	13-Oct-02	LD	LDGD20,21	LBEG/MPEG	0.87% /0.12%	105/4.0	LDGD20,21 tripped. Possible ROQU6 transient.

Summary of RSS Trips at LANSCE for Calendar Year 2002 (in order of occurrence)							
No.	Date	Area	Device	Affected Beams	Duty Factor	Average Current	Comments
54	14-Oct-02	WNR	1RGD3	MPEG	0.12%	4	EPICS magnet control screen for 1RBM02 called up to correct drifting current. As soon as extra line selected on the slider control current jumped from 145 to 149 causing spill at 1RGD3.
55	14-Oct-02	1R	1RGD3	MPEG	0.12%	4.5	Tuning LINAC for spill w/module 2 and tripped 1RGD3 on PSS and Gain.
56	16-Oct-02	LD	LDGD20	LBEG	0.87%	100	LDGD20 tripped after a ROQU6 transient.
57	16-Oct-02	LD	LDGD20	LBEG	0.87%	105	LDGD20 tripped after a ROQU6 transient.
58	18-Oct-02	LD	LDGD17,18,20,21	LBEG	0.87%	105	LDGD17,18,20,21 tripped after a ROQU6 transient.
59	21-Oct-02	PSR	LDGD20	LBEG	0.13%	15	LDGD20 tripped after a ROQU6 transient.
60	23-Oct-02	WNR	LDGD20,21	LBEG	0.04%	4	LDGD20,21 tripped after a ROQU6 transient.
61	25-Oct-02	LD	LDGD20,21	LBEG	0.44%	55	LDGD20,21 tripped after a ROQU6 transient.
62	25-Oct-02	LDN Fence	LDN fence	LBEG/MPEG	1.13% /0.12%	110/4.5	LDN fence was entered prior to inserting LDBL1/2.
63	27-Oct-02	WNR	TGT 4 FP Dropped	MPEG	0.12%	4.5	4FP90L door was found ajar.
64	28-Oct-02	LD	LDGD20,21	LBEG	1.13%	111	LDGD20,21 tripped after a ROQU6 transient.
65	29-Oct-02	LD	LDGD16,17,18,20,21	LBEG	1.13%	111	LDGD16,17,18,20,21 tripped after a ROQU6 transient.
66	1-Nov-02	ER-1	ER-1 FP's OK	LBEG	1.13%	110	ER-1 FP4 Zone 1 sample hatch was lifted before the shutter was closed.
67	1-Nov-02	LD	LDGD17,18,20,21	LBEG	1.13%	110	LDGD17,18,20,21 tripped after a ROQU6 transient.
68	18-Nov-02	LX	LC/LB PACS dropped	WNR	0.01%	0.3	Loop break fault. The line C/B gate was found to be popped open.
69	19-Nov-02	LD	ER-1 FP OK	N/A	N/A	N/A	Mercury drained from the FP-8 shutter without locking and tagging out 1LBS01 in and 1LDS1 open.
70	23-Nov-02	LD	TGT 4 FP's Not Okay	LBEG/WNR	1.13% /0.05%	110/1.9	TGT 4 FP OK tripped on side A only. TGT 4 FP showed all FP's secured. WNR side A&B were all made up. TGT4 15R shutter was in the intermediate position.
71	25-Nov-02	LD	LDXL00	LBEG	1.13%	110	LDXL00 trip cause is unknown. Performed AOM 6.15.F.
72	25-Nov-02	LD	LDXL00	LBEG	1.13%	110	LDXL00 trip cause is unknown. Performed AOM 6.15.F.
73	25-Nov-02	LD	LDXL00	LBEG	1.13%	111	LDXL00 trip cause is unknown. Performed AOM 6.15.F.
74	26-Nov-02	LD	LDXL00	LBEG	1.13%	114	LDXL00 trip cause is unknown. Performed AOM 6.15.F.
75	28-Nov-02	LD	LDXL00	LBEG	1.13%	115	LDXL00 tripped for no apparent reason. Performed AOM 6.15.F.
76	28-Nov-02	LD	LDXL00	LBEG	1.13%	119	LDXL00 tripped for no apparent reason. Performed AOM 6.15.F.
77	28-Nov-02	LD	LDXL00	LBEG	1.13%	115	LDXL00 tripped for no apparent reason. Performed AOM 6.15.F.
78	29-Nov-02	LD	LDXL00	LBEG	1.13%	120	LDXL00 tripped for no apparent reason. Performed AOM 6.15.F.
79	30-Nov-02	LD	LDXL00	LBEG	1.13%	120	LDXL00 tripped for no apparent reason. Performed AOM 6.15.F.
80	30-Nov-02	LD	LDXL00	LBEG	1.13%	120	LDXL00 tripped for no apparent reason. Performed AOM 6.15.F.
81	30-Nov-02	LD	LDXL00	LBEG	1.13%	120	LDXL00 tripped for no apparent reason. Performed AOM 6.15.F.
82	30-Nov-02	WNR	TGT 4 90 L	MPEG	N/A	0	Beam was off. The door on FP 90L was not touching the limit switches due to a warped door.
83	4-Dec-02	Line D	LDGD1	LBEG	0.07%	7.5	PSR development in TUBS mode was in progress. LDGD01 tripped. Cause unknown.
84	6-Dec-02	1L	1L TGT flow	LBEG	0.29%	30	Upper target water flow trip.
85	7-Dec-02	PSR	1L TGT flow	LBEG	1.13%	115	Upper target water flow trip. Side "B" only.
86	12-Dec-02	LD	TGT 2/4 fence	LBEG/MPEG	1.13% /0.05%	115/2	TGT 2/4 fence zn 5 dropped on B side only. Prot Sys POC investigating.
87	14-Dec-02	WNR	TGT 2/4 fence	MPEG	0.05%	2	TGT 2/4 fence zone 5 dropped on B side only. Faulted cable was found.
88	18-Dec-02	LD	1LDS01	N/A	N/A	N/A	When removing the group danger lockout/tagout from 1LDS01 control power switch, 1LDS01 shut automatically when the control power breaker was shut.
89	9-Jan-03	LD	LDMP3	LBEG/MPEG	1.13% /0.02%	123/0.031	LDMP3 power supply trip. Caused LDGD1 to fault.
90	15-Jan-03	ER-1	ER-1 Flight Paths OK	MPEG/LBEG	0.02% /1.13%	1/125	Trip was from ER-1 FP's OK. We were able to reset it right away. We have not found any locked in indications. Further investigation found that the FP-4 experimenters inadvertently opened their flight path prior to the shutter being shut.
91	16-Jan-03	ER-1	ER-1 FP's OK	MPEG/LBEG	0.02% /0.34%	1/37	Trip was from ER-1 FP's OK. Cause was determined to be that a FP-4 experimenter inadvertently opened the FP prior to the shutter being closed. Trip was able to be reset.
92	17-Jan-03	TGT4	Target 4 Flight Paths	MPEG	0.02%	1	Investigation reveals that the door for 4FP90L was ajar. No personnel in the area. Performed a sweep and the area secured normally.
93	19-Jan-03	LD	TGT 1 Flight Path 16 - B Side	LBEG/MPEG	1.0% /0.02%	118/1	1DFP16 experiment was changing out the sample chamber. "B" side only tripped.
94	21-Jan-03	LD	LDGD02	LBEG	0.07%	7	During development. Running wire scanners, LDWS4 was being run at the experimenters request for emittance measurements. Scan completed but integration of GD tripped it after completion of the scan.